

## CLAIMS:

What is claimed is:

1. A method of processing a substrate comprising:
  - growing a first ultra-thin oxide layer on a surface of the substrate to consume defects in a surface region of the substrate;
  - etching away at least a portion of the first ultra-thin oxide layer to remove at least some of said consumed defects from the substrate and reveal a subsurface of said substrate;
  - growing a second ultra-thin oxide layer on said subsurface of said substrate to consume more defects in said surface region of the substrate; and
  - etching away at least a portion of the second ultra-thin oxide layer to remove at least some of said consumed more defects from the substrate.
2. The method of Claim 1, wherein said growing first and second ultra-thin oxide layers each comprise growing an oxide layer having a thickness of between approximately 5Å and approximately 15Å.
3. The method of Claim 1, further comprising:
  - monitoring said surface region of the substrate; and
  - repeatedly growing an additional ultra-tin oxide layer to consume additional defects and etching the additional oxide layer to remove the consumed additional defects based on said monitoring of said surface region.
4. The method of Claim 3, wherein said monitoring comprises using high-resolution transmission electron microscopy (HRTEM) data.
5. The method of Claim 1, wherein the substrate comprises silicon.
6. The method of Claim 1, wherein the substrate comprises at least one of silicon and a silicon alloy.

7. The method of Claim 1, further comprising forming an additional layer on one of said first and second oxide layer using at least one of a thin film deposition process, an oxidation process, and an implantation process.

8. The method of Claim 1, wherein at least one of said etching steps comprises a dry vapor etch process.

9. The method of Claim 1, wherein at least one of said etching steps comprises a wet etch process.

10. The method of Claim 1, wherein at least one of said etching steps comprises using a gas including at least one of a hydrogen containing gas, a fluorine containing gas, and a chlorine containing gas.

11. The method of Claim 10, wherein said using a gas comprises using a gas comprising at least one of HF, H<sub>2</sub>, F<sub>2</sub>, and ClF<sub>3</sub>.

12. The method of Claim 1, further comprising processing a plurality of substrates including said substrate, wherein each of said growing steps and each of said etching steps is performed on each of said plurality of substrates.

13. A semiconductor device comprising a substrate processed in accordance with any one of Claims 1-12.

14. A semiconductor processing apparatus comprising:  
an oxide chamber configured to form an oxide layer on a semiconductor substrate;  
an etch chamber configured to etch the oxide layer; and  
a controller configured to cause the processing apparatus to perform the method of any one of Claims 1-12.

15. A computer readable medium containing program instructions for execution on a processor, which when executed by the processor, cause a substrate

processing apparatus to perform the steps in the method recited in any one of Claims 1-12

16. A substrate processing apparatus comprising:

means for growing a first ultra-thin oxide layer on a surface of the substrate to consume defects in a surface region of the substrate;

means for etching away at least a portion of the first ultra-thin oxide layer to remove at least some of said consumed defects from the substrate and reveal a subsurface of said substrate;

means for growing a second ultra-thin oxide layer on said subsurface of said substrate to consume more defects in said surface region of the substrate; and

means for etching away at least a portion of the second ultra-thin oxide layer to remove at least some of said consumed more defects from the substrate.